Site Need Statement

General Reference Information	
1 *	***Need Title:*** Cleaning, Decontaminating and Upgrading Hanford Pits
2 *	***Need Code:*** RL-WT021
3 *	***Need Summary:*** Hanford desires an alternative to pit work baseline technology. Waste retrieval and transfer operations at Hanford will require extensive use of Single-Shell and Double Shell tank pits. Many of these pits will have to be modified, decontaminated, or prepped before waste can be transferred or retrieved from a tank. Current methods for modifying, operating, decontaminating, and installing equipment in these pits are labor intensive, costly, and result in a high worker dose. As an example, construction activities associated with Tank C-106 required pit access to install sluicing hardware and other equipment. The dose rate experienced in the 241-C-106 pits was 40 R/hr. After investing $2 million and 5 months, worker dose had been reduced to only 20 R/hr. During the pit operations, 25 person rems were accumulated.
4 *	***Origination Date:*** FY 2000 (updated October 2001)
5 *	***Need Type:*** Technology Need
6	***Operation Office:*** Office of River Protection (ORP)
7	***Geographic Site Name:*** Hanford Site
8 *	***Project:*** Safe Storage/Operations and Retrieval **PBS No.:** RL-TWO3, RL-TW04
9 *	***National Priority:*** ___1. High - Critical to the success of the EM program, and a solution is required to achieve the current planned cost and schedule. _X_2. Medium - Provides substantial benefit to EM program projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays). ___3. Low - Provides opportunities for significant, but lower cost savings or risk reduction, may reduce the uncertainty in EM program project success.
10	***Operations Office Priority:*** Medium
Problem Description Information	
11	***Operations Office Program Description:*** The overall purpose of the safe-storage function is to operate and maintain the double shell tank (DST) and single shell tank (SST) farms in a safe and compliant manner until the contained wastes are retrieved and the tank farms are ready for closure. This includes performing day-to-day operations, maintaining and upgrading infrastructure, resolving safety issues, assessing tank integrity, characterizing the waste, and managing the DST waste inventory. This function also includes interim stabilization of selected SSTs. The end state of safe storage is containment of DST and SST tank wastes in a manner that supports safe waste retrieval for final waste disposal; tank-farm structures, including DSTs and SSTs, ready for final disposal and closure; and tank farms amenable and ready for the mitigation of any environmental releases that occurred during storage and retrieval of tank waste. The overall purpose of the Retrieve and Transfer SST Waste function is to move the waste from the SSTs into preferred storage in the DST system. A primary objective of this function is to develop and test alternative and improved retrieval technologies to past-practice sluicing. As part of this effort Leak Detection Monitoring and Mitigation (LDMM) approaches are being developed for concurrent deployment. To support this effort Cold Test Training & Mock-up Facilities are being established. The baseline end state of the Retrieve and Transfer SST Waste function is: • Retrieval of all wastes from the SSTs • The safe, environmentally compliant transfer of this waste to the SSTs • SSTs in a ready state for implementing closure and final disposal of the SST farms. The overall purpose of the Retrieve and Transfer DST Waste function is to provide feed to the Waste

	Treatment Plant (WTP) and receive waste from SSTs. A primary objective of this function is to provide the tank farm infrastructure necessary to deliver waste to the WTP within established specifications. The baseline end state of the Retrieve and Transfer DST Waste function is: • Retrieval of all wastes from the DSTs • The safe, environmentally compliant transfer of this waste to the WTP • DSTs in a ready state for implementing closure and final disposal of the DST farms.
12	***Need/Problem Description:*** A significant number of pit entries will be required to modify, upgrade, and or install equipment to support waste retrieval and transfer operations at Hanford. Current methods for working in pits rely on pole tools, mirrors, and other extended reach hand tools to perform pit activities. These methods are labor intensive, costly, and result in a high worker dose. During FY00 remote technologies and deployment configurations were evaluated for Hanford tank farm pits. A procurement specification was developed and a commercial off the shelf remote arm and deployment platform was procured during FY01. The first deployment of the system will occur in FY02. Subsequent deployments in tank farm pits will allow operators to evaluate the effectiveness of remote technology, provide recommendations for improvements, and evaluate and adapt end effectors and other tooling configurations to operate with a remote system. The intend is to refine the functions and requirements for tank farm remote systems, develop improved remote system that adapt to a broader range of tank farm pits and condition, and develop the infrastructure and ancillary tools that will improve worker safety, reduce exposure and reduce cost. **Consequences of Not Filling Need:** For SST C-104 retrieval, 1 million dollars has been projected for required pit cleaning, decon and upgrades to install SST retrieval equipment. Several SST retrieval projects will be beginning construction activities in the 2004, 05, and 06 time frames that require pit modifications and/or pit work to install retrieval hardware. These include tanks C-104, S-112, and S-102. If 67 Hanford Site tanks must be retrieved, with potential pit decontamination cost per tank at 1 million dollars each, total costs could be excessive, thereby affecting critical enforceable tank waste remediation milestones. ** Program Baseline Summary (PBS) No.: RL-TW03, RL-TW04 ** Work Breakdown Structure (WBS) No.: 5.02.01.02.06.04.10, 5.01.03.04.02 ** TIP No.: Candidate
13	***Functional Performance Requirements:*** Improved methods of pit decontamination must reduce setup time and in pit debris/equipment removal time and thereby lower overall cost while at the same time reducing the dose received by the workers. Cleaning and decontamination methods should be able to reduce the background radiation in the pits better than present methods, which are only capable of a factor of 2 reduction. Specifically: • Reduce the dose levels at the edge of the pit to as low as reasonably achievable by a combination of trash removal and decontamination. • Assist in the removal of heavy objects from the pit. • Assist with size reduction and debris removal • Provide jumper and connector measurements, accurate to ±1/64 in., so replacement/alternate jumpers can be fabricated without operator entry into the pit to obtain measurements. • Provide devices to support change out and/or install jumpers in less than one shift. • Perform as many pit decon and refurbishment operations as possible with the greenhouse roof in place. • Provide CCTV viewing of in-pit operations. **Possible Concept:** A modular system would allow selection of required tools for the job at hand. The system should have a green house (confinement system) and shielding wall. The positioning system is capable of deploying various tools such as a reactionless impact wrench, a shears, and a band saw. **Outsourcing Potential:** All phases of this need have potential for commercial applications in facilities where remote operations are required.
**	**Schedule Requirements*:*** To support the Tri-Party Agreement M-45 series milestones, the current single shell tank retrieval schedule shows the start of pit cleanup and upgrade for tank 241-C-104 in June 2003.

	New methods of pit decontamination will be needed on this project. Future waste retrieval operations will require work in many of the contaminated pits. These operations will significantly increase in 2006.
14	***Definition of Solution:*** A system that improves on current methods for cleanup, decontamination, equipment removal and configuration changes, and other intrusive pit activities with resulting decrease in personnel exposure, decrease in cost, and schedule acceleration.
15 *	***Targeted Focus Area:*** Tanks Focus Area (TFA)
16	***Potential Benefits:*** There are a number of critical risks that this alternative reduces. These include: • The risk of not being able to stage feed as fast as the WTPC Processing Rate (Critical Risk 9). • The risk of not being able to stage feed fast enough due to the need for adjusting off-spec feed (Critical Risk 22 and 25)
17 *	***Potential Cost Savings:*** $100,000,000
18 *	***Potential Cost Savings Narrative:*** Over 600 pits exist at the Hanford Site, representing a range of contamination and complexity. Recent experience on the W-320 Project required more than $2 million for decontamination of a single pit, and was not completed sufficiently to allow manned entry. Reduced effort to make pits ready for piping modifications; over 600 pits – up to $2M/pit.
**	***Technical Basis:*** Existing approaches rely on highly labor-intensive methods and unique job-specific tools. Improved methods can exploit technologies developed for remote handling, surface decontamination with chemicals, and mapping techniques. Small to significant adaptation may be needed.
19	***Cultural/Stakeholder Basis:*** None identified for mapping or remote systems. Washington State Department of Ecology and tribal nations have concerns about use of chemical cleaning solutions that could escape the pit and accelerate contaminant transport in the vadose zone.
20	***Environment, Safety, and Health Basis:*** Present methods require significant worker dose, particularly when manned entry is required for complicated tasks.
21	***Regulatory Drivers:*** Tri-Party Agreement including M-45 Series Single Shell Tank Retrieval milestones
22 *	***Milestones:*** RL09WT22TTP Milestone D.1-1, Complete C-104 heel pit hot deployment 12/15/01; D.1-2 Complete turnover of the Pit Viper system to CHG 4/13/02. T03-05-051—M-43-00 Complete TF Upgrades—2/21/2006
23 *	***Material Streams:*** Sludge, salt, liquid (RL-HLW-20)
24	***TSD System:*** Double Shell Tank and Single Shell Tank systems
25	***Major Contaminants:*** Pu-238, 239, 240, 241; AM-241; U-238; C-14; Ni-59/63; Nb-94; Tc-99; I-129;Cm-242; Sr-90; Cs-137; Sn-126; Se-79; chromium; nitrate; nitrite; complexants (EDTA/HEDTA)
26	***Contaminated Media:*** Tank waste consisting of high molarity sodium hydroxide/sodium nitrate solution containing saturated saltcake and/or sludge.
27	***Volume/Size of Contaminated Media:*** The Hanford Site has 177 underground tanks that store 204 million liters (54 M gallons) of waste containing about 190 MCi of activity. The single shell tanks are generally 75 ft. in diameter, and up to 40 feet deep with their tops buried about 10 feet below the ground surface. All double shell tanks are 75 feet in diameter, and about 40 feet deep, and are similarly buried.
28 *	***Earliest Date Required:*** June 2001
29 *	***Latest Date Required:*** September 2001, additions and upgrades by September 2003
Baseline Technology Information	
30	***Baseline Technology/Process:*** Manual, long-reach tools, conventional decontamination and shielding techniques. **Technology Insertion Point:** Candidate
31	***Life-Cycle Cost Using Baseline:*** TBD

32	***Uncertainty on Baseline Life-Cycle Cost:*** TBD
33	***Completion Date Using Baseline:*** TBD
Points of Contact (POC)	
34	***Contractor End User POCs:*** D.W. (Dennis) Crass, NHC, 509-372-2034, F/509-373-4311,Dennis_W_Crass@rl.gov
35	***DOE End User POCs:*** M.J. (Mike) Royack, DOE-OSD, 509-376-4420, F/509-376-9118, Michael_J_Royack@rl.gov
36 *	***Other Contacts:*** A.H. (Al) Friberg, CHG, 509-376-1190, F/509-372-1608, Allen_H_Friberg@rl.gov K.A. (Ken) Gasper, CHG, 509-373-1948, F/509-376-1788, Kenneth_A_Ken_Gasper@rl.gov

*Element of a Site Need Statement appearing in IPABS-IS
**Element of a Site Need Statement required by CHG